AQ-SPEC

Air Quality Sensor Performance Evaluation Center

Sensor Description

Manufacturer/Model: Aeroqual S-500 OZU

Pollutant: Ozone

Measurement Range: 0-0.15 ppm

Type: Metal Oxide

Time Resolution: 1 Minute

Additional Information

Field evaluation report:
http://www.aqmd.gov/aq-spec/evaluations/field

Lab evaluation report:
http://www.aqmd.gov/aq-spec/evaluations/laboratory

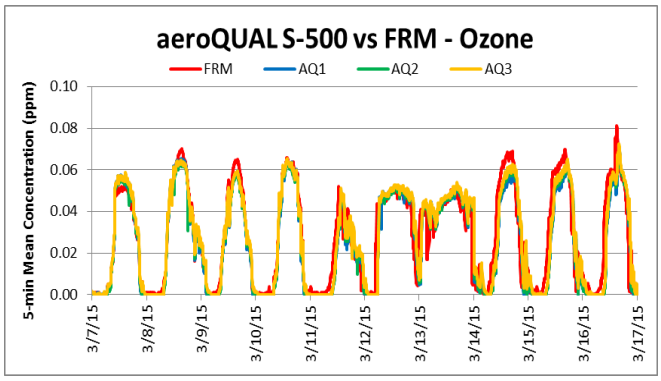
AQ-SPEC website:
http://www.aqmd.gov/aq-spec

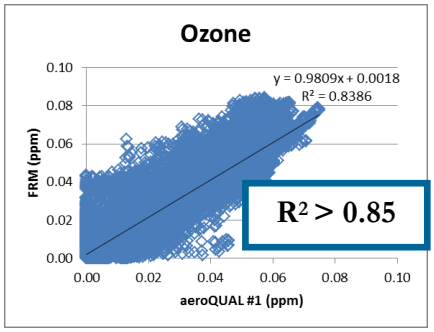
Evaluation Summary

- Overall, the three Aeroqual sensors showed high accuracy, compared to the FRM ozone monitor, for a concentration range between 0 to 150 ppb.
- The three Aeroqual sensors exhibited high precision during most of the tested environmental conditions. Except for high temperature and humidity, sensors had some difficulties recording low concentration ozone.
- The three Aeroqual sensors showed low intra-model variability, as well as good data recovery (100%).
- They have high correlation with the FRM instrument from both the field ($R^2 > 0.85$) and laboratory studies ($R^2 > 0.99$).

Field Evaluation Highlights

- Deployment period 02/10/2015- 04/04/2015: the three Aeroqual sensors followed the ozone concentration change as monitored by FRM instrument.
- The units showed 100% data recovery.
- The units have low intra-model variability (+/- 10%).





Coefficient of Determination (R^2) quantifies how the three sensors followed the ozone concentration change by FRM.

An R^2 approaching the value of 1 reflects a near perfect agreement, whereas a value of 0 indicates a complete lack of correlation.

Laboratory Evaluation Highlights

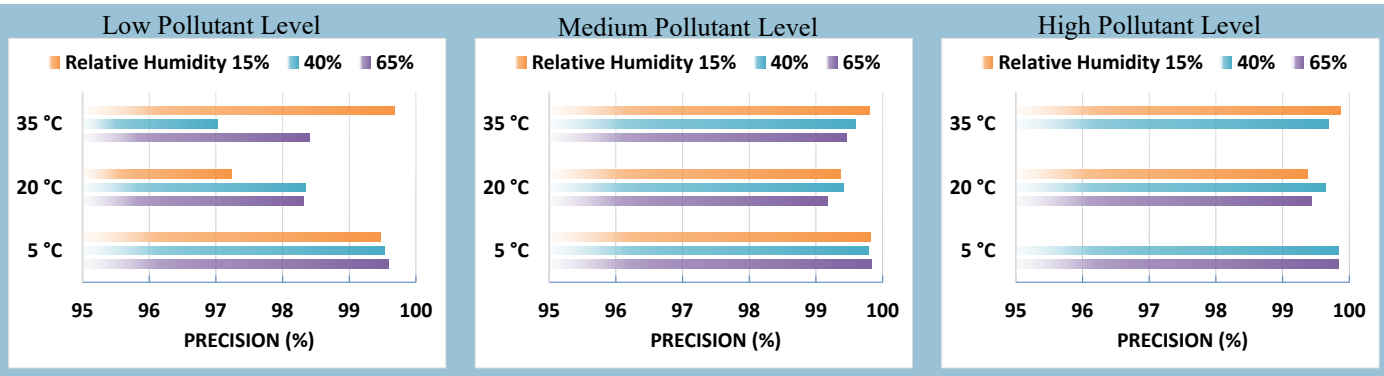
Accuracy

$$A\,(\%) = 100 - \frac{|\bar{X} - \bar{R}|}{\bar{R}} * 100$$

Steady State (#)	Sensor mean (ppb)	FRM (ppb)	Accuracy (%)
1	31.7	28.0	86.8
2	53.6	57.6	93.1
3	73.4	88.4	83.0

Accuracy was evaluated by a concentration ramping experiment at 20 °C and 40%. The sensor's readings at each ramping steady state are compared to the reference instrument.
The higher the positive value (close to 100%), the higher the sensor's accuracy.

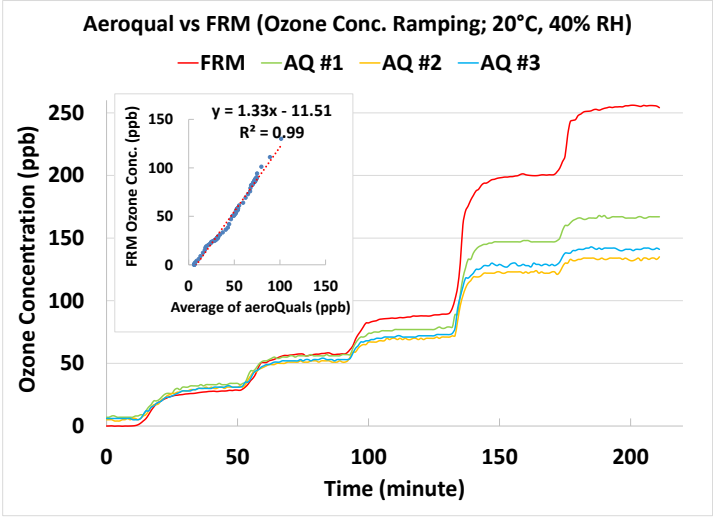
Precision



100% represents high precision.

Sensor's ability of generating precise measurements of ozone concentration at low, medium, and high pollutant levels were evaluated under 9 combinations of T and RH, including extreme weather conditions like cold and humid (5 °C and 65%), hot and humid (35 °C and 65%), or hot and dry (35 °C and 15%).

Coefficient of Determination



The three Aeroqual sensors showed excellent correlation with the corresponding FRM data ($R^2 > 0.99$) at 20 °C and 40% RH

Climate Susceptibility (Coefficient of Determination R^2)

R^2	5 °C	20 °C	35 °C
15%	0.97	0.98	0.99
40%	0.95	0.99	0.99
65%	0.99	0.98	0.96

Observed Interferents

High temperature coupled with high humidity.